

American Potato Journal

Volume XI

April, 1934

Number 4

NEW POTATO VARIETIES

F. J. STEVENSON AND C. F. CLARK

Bureau of Plant Industry, U. S. Dept. of Agriculture

The title of this paper may be somewhat misleading since, although it gives the present status of the three new varieties of potatoes, Katahdin, Chippewa and Golden, it is also a partial report of progress of the potato-breeding program which is being carried on cooperatively between the United States Department of Agriculture and a number of the State Experiment Stations.

The development of potato varieties resistant to disease is being emphasized to a greater degree than ever before by those engaged in potato breeding in the United States and elsewhere. From the results that have been obtained it is quite evident that some of the virous diseases, late blight, and common scab can be controlled by producing varieties resistant to their attacks. Although varieties are at present available resistant to one or the other of these diseases, much work will be required to recombine in a single sort the genetic characters involved, since a disease resistant variety is of no commercial value unless it can produce a high yield of smooth, desirably shaped tubers with good cooking quality.

As one of the results of a plant breeding program which had for its definite purpose the production, by hybridization and selection, of varieties of potatoes resistant to a virous disease, a large number of varieties are now available which are resistant to one of the commonest virous diseases known as mild mosaic. Two of these have been named and are being distributed as rapidly as possibly to growers in sections to which they are adapted. Seedling 41956 is resistant, if not immune, to another virous disease—latent mosaic—and attempts are being made to combine the resistance to the mild and to the latent mosaic in a single variety.

Resistance to two other well known virous diseases, leaf-roll and spindle tuber, seems to be more difficult to obtain, but a large number of tests are being conducted to find varieties which show such resistance.

Thus, by analysis and synthesis it is believed that varieties can be produced eventually which are resistant to all the "running out" diseases of potatoes.

Another disease which adds more to the cost of production of the potato crop than perhaps all the others combined is the late blight. Control measures have been partially successful but these cost money. For many years plant breeders have recognized the importance of producing varieties resistant to this disease and some progress has been made. Several varieties and seedlings are available which show various degrees of resistance. The late blight epidemic prevalent in 1932 afforded an excellent opportunity to test at Presque Isle, Maine, the reaction of a large number of potato seedlings to this disease. Approximately 700 seedlings representing 4 different progenies and about 100 Green Mountain checks were grown in plots of 20 to 30 hills each. These plots were not sprayed with Bordeaux throughout the growing season. On July 22 the first late blight infection was observed. Very favorable conditions for late blight prevailed during August and the first part of September, so that by the latter part of August this disease had spread over the plot in epidemic form. Observations during the first week in September showed that most of the seedlings and all of the Green Mountain checks had succumbed to late blight which had completely killed the leaves and stems. At this time six seedlings, all selections of a progeny of Katahdin naturally fertilized, showed only a few leaves infected with late blight, while approximately $1/5$ of the leaves of eleven other seedlings remained free from late blight infection. Some of these seedlings together with a comparatively large progeny of No-blight x Katahdin and a number of progenies kindly sent to us by K. O. Muller, Berlin-Dahlem, Germany, were grown in an unsprayed plot at Presque Isle in 1933.

In contrast to 1932 there was so little late blight in 1933 that the susceptible Green Mountain checks were uninjured. As a consequence the field test for late blight resistance for the season of 1933 was a failure.

None of the apparently blight-resistant seedlings produced up to this time are very promising from the commercial standpoint but the best of them are being used as parents of hybrids in an attempt to combine resistance to late blight with other desirable characters.

Under certain conditions potato varieties with russet skin such as Russet Burbank and Russet Rural have shown marked resistance to common scab. Recently in the breeding work at Presque Isle a seedling was produced, more heavily russeted than either of these varieties.

This seedling, No. 44537, has shown also a higher degree of resistance to scab than any variety tested to date.

The results of the tests with this seedling in Iowa in 1933, as reported by A. T. Erwin, of the Iowa Agricultural Experiment Station, are especially interesting. It shows that in one test on a farm near Crystal Lake, Iowa, on raw peat soil heavily infested with the common scab organism, 44% of the tubers of seedling 44537 were entirely free from scab while only 1% of the Irish Cobbler tubers was clean and 11% of the Chippewas.

In another test near Hanlontown, Iowa, this seedling was planted in alternate hills with Irish Cobbler, on soil known to be seriously infested with scab. This crop was harvested by C. L. Fitch, who reported to Mr. Erwin as follows: "The Cobblers were all scabby, most of them completely covered with a heavy growth of surface scab. With a few exceptions, perhaps 3 or 4 per cent, seedling No. 44537 was noticeably clean." As a result of these tests Mr. Erwin concludes: "Seedling 44537 appears promising as to scab resistance but ranks a little below Cobbler in yield. However, the grower could well afford to sacrifice the difference in order to secure clean potatoes."

It should be pointed out here, however, that the yield of this seedling at the Aroostook Farm, Presque Isle, Maine, and in other tests, has been so far below the Irish Cobbler that it cannot be recommended to growers unless their conditions are such that scab is the limiting factor in raising a profitable crop. Although this seedling will probably never be grown commercially to a great extent, it is being used extensively as a parent in an effort to produce higher yielding varieties resistant to common scab.

KATAHDIN

The Katahdin variety continues to be free from mild mosaic and in most instances to produce good yields of smooth, well shaped potatoes. The ability to produce tubers with desirable shape even under adverse soil and climatic conditions is an important characteristic of the variety. It also consistently produces a high percentage of No. 1 potatoes.

In the tests at Aroostook Farm, Presque Isle, Maine, there has been no significant difference in yield between Katahdin and Green Mountain for an average of 4 years. In other comparisons with Green Mountain, in Rhode Island and Massachusetts, the difference seems to favor the Green Mountain slightly. A car load of Katahdin was planted in New Jersey in 1933 and several of the growers in that State are enthusiastic over the results.

The 1932 report from North Carolina showed that Katahdin is in demand in the higher altitudes of that State because of the attractiveness of the tubers and the high percentage of No. 1 potatoes produced. The 1933 report from Jefferson, Ashe County, however, is not so favorable, since the Katahdin was outyielded by Chippewa, Golden, Warba, Irish Cobbler, and six other numbered seedlings.

There are indications that it will replace varieties of the Rural group of potatoes in some of the higher altitudes of Colorado. At the Experiment station at Greeley, Colorado, the Katahdin produced 43% more primes than the Rurals as shown in a report by W. C. Edmundson, for 1933. He does not favor the variety for the Greeley district, however, for as he says, "Occasionally very large tubers are produced and frequently the eyes are deep. Mr. Metzger, of the Colorado Agricultural College, distributed Katahdin to a number of growers in the Western Slope District of Colorado, and he has received numerous reports of their excellent performance. He also has had some difficulty at the Avon station with tubers becoming too large. He writes that occasionally they reach two pounds in weight."

In 1931 and 1932 Katahdin was grown in Oregon in comparison with the Russet Burbank (Netted Gem) and Burbank. The 1932 report of E. N. Bressman, Oregon Agr. College, showed that in Lane County 90 per cent of the Katahdin tubers graded No. 1, whereas the Burbank varieties grown on the same farms under like conditions graded approximately 50 per cent No. 1. The conditions were, of course, unfavorable for the Russet Burbank.

Katahdin was tested at Moscow, Idaho, in comparison with 4 standard varieties in 1933. The growing conditions were unfavorable for potato production and Katahdin demonstrated again its ability to produce a large percentage of No. 1's in spite of the rather adverse conditions. The yields were low in all cases but the Katahdin yielded about 4 times as many primes as the Russet Burbank, 3 times as many as the Irish Cobbler, nearly twice as many as the Early Ohio, and approximately 1½ times as many as Bliss Triumph. The percentage of marketable potatoes for each of the different varieties was as follows: Russet Burbank (Netted Gem) 31%, Irish Cobbler 39%, Early Ohio 52%, Bliss Triumph 69%, and Katahdin 87%. J. M. Raeder, who made the tests in Idaho reports that he is still of the same opinion as he was a year ago. The Katahdin proved again to be free of the mottling type of virous troubles. It is an excellent yielder, producing a fine type of tuber. He plans to distribute it to growers in north Idaho in the cut-over sections to replace a variety which they call Idaho

Rural but which in reality is the Charles Downing. This variety is very badly diseased with virous troubles, the cleaning up of which seems hopeless. He says, "We have hopes and some indications that the Katahdin will supplant the Rural (Charles Downing) in that section."

Reports from Michigan and Iowa indicate that the Katahdin will replace the Rural varieties in those states, at least in part. Under some conditions the Rurals outyielded the Katahdins as is shown by the 1933 tests at Ithaca, New York; Garrett County, Maryland, and on mineral soils at Wooster, Ohio. Under other conditions there is no preference between the two varieties so far as yield is concerned as is shown by the 1933 report from Michigan. In six tests in which the Katahdin was compared with the Russet Rural in that State, the Katahdin yielded on the average 228.2 bushels per acre and the Russet Rural yielded 227.6. Under adverse conditions such as prevailed in Michigan in 1931, however, the Katahdin consistently outyielded the Russet Rural.

On muck soil in Ohio in 1933 the Katahdin yielded 341.9 bushels of primes per acre; the Russet Rural 329.7, Late Cobbler 355.0, and Irish Cobbler 149.2. The differences in yield here are probably not significant but John Bushnell, who conducted the tests at Wooster, Ohio, says that it looks as though Katahdin would find a place on the muck soil in Ohio. It is about the same season as the Late Cobbler and has much smoother tubers. He is going to encourage growers to compare the Katahdin with the Late Cobbler (now that seed of Katahdin is available in commercial channels).

The reports from place to place and from year to year are so variable that it is difficult to make definite recommendations but it is evident that the Katahdin will not replace the Green Mountain under conditions very favorable for that variety such as usually exist in the Northeastern section of the United States. If, however, mosaic resistance, and smoothness of tuber are taken into consideration it will be preferred by many growers. It should replace the Rurals in part in Michigan and Iowa, especially under conditions which are not favorable to the Rurals. It probably will find a place too in the higher elevations of Colorado. In Oregon and Idaho especially under adverse growing conditions it has outyielded the Russet Burbank (Netted Gem) and may replace the Idaho Rural (Charles Downing) in the cut-over lands in North Idaho. It has been increased as rapidly as possible and as a result there ought to be sufficient certified seed available to meet most of the demands of the growers for 1934.

CHIPPEWA

The Chippewa potato also has shown a high degree of resistance to mild mosaic. In a total of approximately 13,500 plants of this variety on the breeding plots at Presque Isle during the eleven years it has been grown, only 14 plants showing mosaic symptoms have been found; 5 of these showed the rugose type of mosaic while the type occurring in the other 9 plants has not been determined, but the symptoms were not those of mild mosaic. In the disease-resistance test plots, where this variety was grown between rows of Green Mountain stock known to be infected with mild mosaic, no Chippewa plants were found which showed symptoms of this disease, while under the same conditions 68% of the plants of the Green Mountain checks contracted the disease.

In all tests in which yield records have been obtained the Chippewa has consistently yielded high. Comparative tests at Presque Isle have shown that in total tubers produced it yielded significantly higher than Katahdin, Irish Cobbler, Green Mountain, and Rural New Yorker No. 2 for an average of two years (1931 and 1932). In the same two years it produced more No. 1 potatoes than any of the four other varieties, but in the light of the probable error there was not a significant difference in the yields of primes of Chippewa, Katahdin, and Green Mountain. In 1933 the Green Mountain yielded slightly higher than the Chippewa but the difference was not significant.

The results of tests in other sections of the country are quite variable. Five years' tests in Michigan and four in Minnesota have led to the conclusion that it is better adapted to certain conditions in these States than the Katahdin because of its earlier maturity.

F. A. Krantz, of the University of Minnesota, writes, "The Chippewa is doing very well in this state. It appears to be quite well adapted as a main crop in the northwestern part of the state and also in the north central part."

E. J. Wheeler, of the Michigan Agricultural College, made the following comment in a letter in September, 1933, "The Chippewa potatoes are making an excellent showing. Comments made by several farmers would indicate that they like the vine growth of the Chippewa much better than that of the Katahdin." The final yield data from Michigan show that in the test at Lake City, Chippewa outyielded Green Mountain by 34.8%. In another test, however, in the Upper Peninsula, the Green Mountain outyielded the Chippewa by 6.5%. In two tests in which it was compared with Russet Rural the Rural outyielded the Chippewa by 18.5%. The results, therefore, so far as yield is concerned are not conclusive.

At Fargo, North Dakota, the results with Chippewa are not promising. A. F. Yeager, of the North Dakota Agricultural College, says, "Personally, I am not overly pleased with Chippewa because the potatoes are borne on the end of such long stolons."

On the other hand reports of the 1933 tests in New Jersey, Florida, Louisiana, and Riverside County, California, are very favorable. As this is the first year, however, that comparatively extensive tests have been made, too much weight cannot be given the results but the indications are that the Chippewa will find a place as a commercial variety in several sections of the United States.

GOLDEN

The Golden, a yellow-fleshed variety, has not been tested sufficiently to determine its adaptation. In the yield test at Aroostook Farm, Presque Isle, Maine, in 1933, it yielded higher than Green Mountain, but the difference was not significant. For the three-year average, however (1931-1933), there is a significant difference in yield between the Green Mountain and Golden in favor of the Golden. The tests of this variety in other cooperating states have been rather limited so far and the results obtained have not been promising. More extensive tests will be made in 1934.

SUMMARY

Breeding potatoes for disease resistance is being emphasized in the cooperative potato-breeding program which is carried on between the United States Department of Agriculture and a number of the State Experiment Stations.

A large number of varieties have been produced that are resistant to one of the commonest virous diseases known as mild mosaic. Two of these have been named and are being distributed. One seedling at least is resistant to another virus, latent mosaic. An effort is being made to combine the resistance to the mild and to the latent mosaic in a single variety.

Tests of a large number of varieties and seedlings are being conducted to find varieties which show resistance to two other virous diseases—leaf-roll and spindle tuber.

Several varieties and seedlings are available which showed resistance to late-blight during the blight epidemic year of 1932. Comparatively no blight developed in 1933 and as a result the field test for late blight resistance was a failure. None of the seedlings apparently resistant to late blight are very promising from the commercial standpoint but the best of them are being used as parents in the work of breeding for blight resistance.

One heavily russeted seedling, No. 44537, has shown a higher resistance to common scab than any varieties tested to date. This is true not only at Presque Isle, but also in tests in Iowa on peat soil heavily infested with the scab organism. The yield of this seedling at the Aroostook Farm, Presque Isle, and in other tests has been so far below the Irish Cobbler, however, that it cannot be recommended to growers unless their conditions are such that scab is the limiting factor in raising a profitable crop.

Katahdin continues to be free from mild mosaic, and is gaining favor with growers in different parts of the country because of the high percentage of smooth prime potatoes which it usually produces. It has been increased as rapidly as possible and as a result there ought to be sufficient certified seed available to meet most of the demands of the growers in 1934.

Chippewa is preferred to the Katahdin in some sections as it is somewhat earlier and produces, under conditions favorable for both, slightly higher yields. The seed stock of this variety is not as yet being produced on a commercial scale although a considerable amount will be grown in test plots in 1934.

Golden has not been tested extensively enough to determine its adaptation. Grown under very favorable conditions such as prevailed at Presque Isle, Maine, in 1931 and 1932 it decisively outyielded Green Mountain. It outyielded Green Mountain again in 1933 but not significantly. The reports from tests in other sections of the country in 1933 were not promising.

FERTILIZER PLACEMENT STUDIES ON POTATOES IN MAINE—1932 AND 1933

JOS. A. CHUCKA

Maine Agricultural Experiment Station

The Maine Agricultural Experiment Station in cooperation with the United States Bureau of Chemistry and Soils and the United States Bureau of Agricultural Engineering has conducted fertilizer placement studies on potatoes in Aroostook County during the past two seasons. In 1932 seven different placements were tried with 4-8-7 and with 8-16-14 fertilizers. With one exception the placements used in Maine were similar to the general placements used in New Jersey, Virginia, Ohio and Michigan. In the case of this exception, the standard Aroostook planting method, the fertilizer was dropped at the sides and somewhat above the level at which the seed pieces were planted.

Thus the planter shoe spread the fertilizer bands and the rear covering discs picked up some of the fertilizer and rolled it up into the ridge. This placement was considered representative of the average placement obtained with the average potato planters used in Aroostook County.

The results secured from our placement studies in 1932 were reported before a meeting of the Joint Committee on Fertilizer Application held in Washington in November 1932.

In 1933 one additional fertilizer placement was included with those used in 1932. This additional placement consisted of applying the fertilizer in the furrow in a band 4 to 5 inches wide, covering with one inch of fertilizer free soil before planting the potatoes. These eight fertilizer placements were used with 4-8-7 and with 8-16-14 fertilizers.

Table 1 shows a summary of the total yields obtained in the fertilizer placement studies during the two years. In 1932 the 4-8-7 fertilizer produced the highest yield when placed at the sides, 2 inches away and 2 inches below the seed pieces. The second highest yield was produced when the fertilizer was placed 2 inches to the side and slightly below the seed pieces. With the 8-16-14 fertilizer the highest yield was produced when the fertilizer was mixed with the soil below the seed pieces. The second highest yield was obtained when the fertilizer was placed 2 inches to the side and slightly below the seed pieces. Considering the average yields obtained with the two fertilizers in 1932 we find that the placements resulting in the three highest yields are as follows: First, at the sides 2 inches away slightly below the seed pieces; second, at the sides 2 inches away and 2 inches below the seed pieces and third, mixed with the soil below the seed pieces.

In 1933 the 4-8-7 fertilizer produced the highest yield when placed at the sides 1 inch away slightly below the seed pieces. The second highest yield resulted when it was placed at the sides 2 inches away and 2 inches below the seed pieces. The 8-16-14 produced the highest yield when placed in a 4 to 5 inch band 1 inch below the seed pieces and the second highest yield when placed at the sides 1 inch away slightly below the seed pieces. Considering now the average yields obtained with both fertilizers in 1933 we find that the three highest yields were obtained with the following placements: First, at the sides 1 inch away slightly below seed pieces; second, in a 4-5 inch band 1 inch below seed pieces and third, at the sides 2 inches away and 2 inches below seed pieces.

These results seem to indicate that there is some variation in the fertilizer placements which result in the highest yields with kind of

TABLE I
Summary of fertilizer placement studies on potatoes in Maine

Placement of Fertilizer	Potato Yields in Bushels per Acre					Two Year General Ave.	
	1932		1933		Average		
	4-8.7	8-16-14	Average	4-8.7			8-16-14
4"-5" band 1" below seed pieces				314	338	326.0	
4"-5" band 2" below seed pieces	290	267	278.5	298	300	299.0	288.7
Mixed with soil below seed pieces	298	325	311.5	280	303	291.5	301.5
On sides 1" away slightly below level of seed pieces	295	305	300.0	320	332	326.0	313.0
On sides 2" away slightly below level of seed pieces	312	313	312.5	300	316	308.0	310.3
On sides 2" away and 2" below seed pieces	316	307	311.5	318	322	320.0	315.7
On sides 4" away slightly below level of seed pieces	296	274	285.0	307	316	311.5	298.3
Arrostook Planting method	290	307	298.5	304	323	313.5	306.0
No fertilizer			223.0			157.0	190.0
Average	299.6	299.7		305.1	318.7		
Range	26	58		40	38		27

Location: 1932 Ralph Perry Farm, Presque Isle, Maine.
1933 Frank Hussey Farm, Presque Isle, Maine.
Variety: 1932 Green Mountains.
1933 Irish Cobbblers.

Rate of application—2000 pounds of 4-8-7 and 1000 pounds of 8-16-14 both years.
Soil type—Caribou loam both years.

fertilizer and with season. However, in general it will be noted from the general average yields over the period of two years with both fertilizers that the side placements appear to be somewhat superior to placements underneath the seed pieces. This seems to be particularly true when the fertilizer is placed at the side from 1 to 2 inches away and from slightly below to 2 inches below the seed pieces. Due to the fact that both total rainfall and its distribution were rather abnormal in Maine during the last few years it would seem highly desirable to continue this work for several more years before final conclusions may be drawn.

THE USE OF RAPID SOIL AND PLANT TESTS IN TEACHING, RESEARCH AND EXTENSION WORK

C. H. SPURWAY

Michigan State College

Marked changes have occurred within the last decade with respect to the attitude and ideas of agriculturists concerning soil fertility conditions and soil management practices. It is being realized today more than heretofore that ideal soil conditions are rarely found in connection with the profitable production of many of the common crop plants. Farm lands have been depleted in fertility by crop systems that have exhausted the soil of some of its essential plant foods. Present economic conditions require more profitable crop production practices. Consumers of agricultural products are demanding better quality goods and prompt service. In contrast to this situation, research workers in the field of agricultural science have accumulated a greatly increased knowledge of plant growth requirements and of the soil fertility conditions necessary for the profitable production of crop plants in farming, gardening, and greenhouse work. The advent of commercial fertilizers of many kinds, and the growing use of other chemical compounds for soil improvement to meet the requirements of special crops have developed a pressing demand from growers for more complete information concerning their local soil fertility conditions in general, and for rapid means of diagnosing these conditions as a basis for indicating profitable soil improvement treatments.

On farms, golf courses, lawns, in gardens or greenhouses the major factor of profitable or satisfactory crop production is successful plant growth. The problem confronting all crop growers is the production of quality crops at a minimum cost. Growers know what they add to soils as manure, fertilizers, or some other chemical substance, but un-

less the soil is tested in some way they can know very little about the actual soil conditions affecting plant growth in any soil, or the effects of the soil treatments used, until a crop has been grown on the soil. In many cases only through poor crop growth or a crop failure does the grower know that something is wrong with the soil, or that the soil treatment applied is ineffective. Any means by which advanced information can be secured about soil conditions or the effects of soil treatments lessens the hazards and reduces the costs of crop production, thereby placing the business of growing plants on a more profitable basis.

Research workers in the field of soil science have sensed this growing demand for practical information on soil management problems and have devised several simple, chemical methods of testing soils and plants for their content of soluble or available plant nutrient elements, or for the presence of chemical elements or compounds which may be toxic or poisonous to plant growth. These rapid testing methods can be used by almost any-one with a little practice, and they are convenient and useful for soils research, teaching, and extension work. The use of soil tests provides the only way for rapidly measuring and evaluating some of the important chemical properties of soils before planting a crop. Soil and plant tests, used in conjunction with a knowledge of plant growth characteristics, offer a means of determining possible soil excesses or deficiencies that may seriously interfere with normal plant growth. In any case, we must know what a soil needs in order to devise a logical system of soil improvement for it.

In the field of soils teaching, chemical soil tests are useful for lecture demonstrations and laboratory experiments designed to teach some of the fundamental properties of soils, and to call the attention of students to the nature of the prevailing soil problems which they will encounter in their practical work and to suggest ways and means for solving these problems.

Soils research work designed to determine the effectiveness of soil treatments as measured by plant growth characteristics or crop yields, if conducted on a logical basis, must consider the condition of the soil with respect to the many crop growth factors involved, before the treatments are applied, in order to better correlate the effects of the treatments with the prevailing soil conditions, whatever they may be. When several soil factors are involved in the profitable production of a crop, it is a mistake to study the effects of only a few of these factors and neglect the possible effects of the other factors. Stating the idea specifically, it is illogical to attempt to study the effects of an application of commercial fertilizers to a soil on crop growth when some other

soil condition, as an unfavorable soil reaction, a deficiency of some element not contained in the fertilizer, or a toxic condition of the soil may be a limiting factor to plant growth. Chemical soil tests are an aid to soil research when used to diagnose the condition of a soil preliminary to treatment as a means of determining what the treatment should be and for a more logical explanation of the effects of the treatment.

In soils extension work rapid soil tests are useful for pointing out soil conditions, a knowledge of which may be of great importance to the practical farmer or crop grower, by aiding him to compare his soil conditions with some other similar case where certain soil treatments are known to have been effective and profitable. Practical experience has shown that the most fertile soils always contain an abundant supply of plant foods and that they are characterized, also, by the absence of conditions harmful to plant growth. Generally speaking, however, many soils are deficient in one or more of the substances necessary for normal crop production and they may contain, also, substances actually deleterious to plants and thereby reduce crop yields. Plant nutrient deficiencies may often be easily detected in soils by means of these rapid soil tests as well as an acid soil reaction or the presence of a harmful soil constituent. Again, soil tests are useful in showing what the prevailing soil problems of any community may be.

In applying soil tests to diagnose soil conditions and in interpreting the test results from a practical standpoint, consideration must be given to the other factors of plant growth not determined by means of the tests. The major group factors of plant growth are: (1) climatic factors; (2) soil factors—physical and chemical, and (3) factors inherent in the plant itself, as the particular growth conditions it may require. Chemical soil tests are concerned, mainly, with the chemical soil factors and in their use the results should be properly oriented in the general diagnostic scheme and compared with, and if possible, corroborated by all the other evidence that may be obtained by a close study of the local environmental conditions before soil treatment recommendations are made on the basis of the test results. When properly used, chemical soil and plant tests are a distinct and valuable aid in the profitable production of crop plants.

All that has been written in this connection has a direct bearing on the profitable growing of potatoes as well as other crops. When the production of any crop becomes highly specialized in a closely competitive field, more attention should be given to the cultural conditions required for the best results. The soil reaction is important to the

potato grower because soil acidity has been known to reduce the crop hazards of the potato scab disease. The potato requires a fertile soil, however, and cannot be grown successfully on soils deficient in plant nutrients. The crop is sometimes fertilized heavily which, in time, may result in an unbalanced condition of soil fertility due to the accumulation of fertilizer residues and the exhausting of the soil of the elements not commonly applied in fertilizers. In some of the eastern states magnesium deficiency in soils is becoming known as a limiting factor in profitable potato production. A more general use of soil testing methods would aid the potato grower in diagnosing his soil conditions and would, undoubtedly, be the means of discovering other soil conditions of importance to him, in addition to those mentioned here.

SECTIONAL NOTES

NORTH CAROLINA

Plantings in the vicinity of Jefferson are increased 20 to 25 per cent over last year. This crop is harvested in August and September and is sold mostly in Eastern Tennessee and Western and Central North Carolina.

Potatoes were just coming up in Eastern North Carolina the week of April 2 so that it is impossible to furnish definite information on the condition of the crop at this time. Many growers planted early and lost their seed in the heavy freeze in early February. Most of this acreage was replanted. During this same freeze some seed that was stored in barns was badly damaged. It is true also that we have had a cold, wet spring which might cause a great deal of loss from Rhizoctonia.

A reduction in cotton and tobacco acreage has resulted in large increases in truck crops of all kinds, particularly potatoes, tomatoes, cucumbers and snap beans. This is probably true also in other southern states.—Robert Schmidt.

SOUTH CAROLINA

Our potato crop is up to a good stand. Weather conditions have been very favorable, with the exception that a small part of the acreage in Beaufort County is now beginning to need rain. The prospects at this time are for a very good crop, with shipments getting under way around May 15 to 20.—George E. Prince.

NEBRASKA

The Nebraska Potato Improvement Association held very well attended sessions at Alliance on March 14-15, and at Scottsbluff on March 16. The potato crop has on the whole been profitable for the growers in western Nebraska, especially if considered in comparison with other farm crops. In these meetings considerable interest was manifested in methods which will enable growers to cut down cost of production. There seems to be developing a very definite realization that during the coming year the quality of market potatoes must be improved and that only the better grades are likely to sell at a profit.

The certified Triumph seed potato business has come through the past season with fair to good returns realized by the growers. During the coming year a more definite seed improvement program is being inaugurated. Seed potatoes indexed by the Department of Horticulture of the State Experiment Station will be increased on the Box Butte county Experimental Farm (which is devoted principally to potatoes). About 7 tuber lines representing distinct seasonal types of Triumph potatoes will be increased. The crop from the seed plat of the Experimental Farm will be issued to a selected group of 5 or 6 farmers who will increase the stock for distribution to the certified seed potato growers. The entire program is being administered by the certification division of the Nebraska Certified Potato Growers Cooperative. The Cooperative will assume responsibility for supervising the planting of all plats by the tuber unit method and later of thoroughly roguing the seed plats located both on the experimental farm and on the increase farms. It will also control the distribution of all potatoes produced on these seed farms. By this method there will be grown each year in the seed plats about 8,000 or 10,000 bushels of potatoes which trace back to indexed tubers two or three years earlier. According to this plan it is hoped to have available a very superior supply of seed stock for all people starting into the certification business or for any growers who care to change seed stock due to the deterioration of their own stock. A very large amount of the roguing is eliminated and the percentage of rejections due to virous diseases is very greatly reduced. Thus the production of certified seed is made less hazardous and the quantity available from year to year is more thoroughly stabilized.

In southeastern Nebraska there is an unusually keen interest in the planting of early potatoes on the part of small gardeners,

farmers raising potatoes for home use and for a limited commercial production, as well as on the part of established commercial producers. As elsewhere in the country, the relief agencies are stressing home gardens and are endeavoring to arrange to have every family, that is drawing relief, raise its own supply of potatoes. As a consequence the market for seed potatoes is quite satisfactory, but all these trends indicate that there is likely to be a very large supply of early potatoes, that is during July and August.

It is rather difficult to venture an estimate of the probable commercial potato acreage in the western district. In the irrigated regions the acreage of potatoes will depend somewhat upon the status of the sugar beet industry, the broader policies of which are just being arrived at, as this statement is being written. It seems very reasonable to expect that because of the interest being manifested in potatoes this spring and the satisfactory returns from the crop last year, that many growers will increase the acreage of potatoes, especially if the acreage of some of the other crops has been curtailed. The acreage devoted to the growing of certified seed potatoes will probably remain at about the same level that it has been for several years.—H. O. Werner.

SOUTH DAKOTA

The following resolution was adopted by the South Dakota Potato Growers' Association on April 3, 1934. This is a matter which should receive the serious consideration of all potato growers since the increase in potato acreage this year is due, in part at least, to the fact that land formerly planted in other crops is now being planted with potatoes. The various local potato associations should interest themselves in this and it would appear to be particularly important that we have a strong national association to look after the interests of the potato industry.

RESOLUTION

WHEREAS, The Agricultural Adjustment Act which became effective May 12, 1933, did not specify potatoes as one of the basic commodities and only allowed the Secretary of Agriculture to enter into marketing agreements with processors, associations of producers and other handlers of products, thus not providing a workable method for production control of potato acreage, and

WHEREAS, The Secretary of Agriculture has allowed the planting of potatoes on the "slack" acres caused by the different base periods used in the various production control programs, and

WHEREAS, The potato industry, according to governmental forecasts, is already facing an increase in potato acreage above what our normal consumption will be with average yields and resultant low prices for the 1934 crop, and

WHEREAS, The South Dakota Potato Growers' Association feel that potatoes are one of the most important cash crops in the United States to-day,

Therefore be it RESOLVED, That the South Dakota Potato Growers' Association go on record registering a protest to the Secretary of Agriculture against the recommended use of "slack" acres for the production of potatoes which will still further increase acreage through people who do not make a specialty of potato growing as a cash crop.

Be it further RESOLVED, That copies of this resolution be sent to Henry A. Wallace, Secretary of Agriculture; Chester C. Davis, Administrator Agricultural Adjustment Act; and The Potato Association of America.—Asa Lebert, President; Phyllis C. Wendell, Secretary.

MARYLAND

February was an unusually cold month in this section. When thaws occurred in early March, fields were very wet and farmers were unable to plow or make other preparations for potato planting. I have been informed that a number of potato growers had cut their seed during February and that a considerable portion of the seed rotted before it could be used. The supply of seed is limited and, because of high prices, it is doubtful if the farmers will plant the acreage they had intended to plant. Furthermore, there has been some agitation on the part of people who attempt to advise our potato growers to curtail intended plantings for this year. It is impossible to interpret the effects of these various factors on this year's acreage, but all indications point to a decrease over the original intentions to plant.—RICHARD C. ROSS.

NEW JERSEY

Despite the fact that weather conditions have not been particularly favorable this spring, approximately 95 per cent of the acreage in Central New Jersey was planted by April 25. Some growers completed

their planting operations before the 15th of the month so that much of the crop was planted as early or earlier than last year. It is difficult to report definitely the increase in acreage but leading dealers, as well as county agents and farmers, estimate an increase of 12 per cent.

Most of the acreage in New Jersey is planted with the Irish Cobbler variety. The seed was grown in South Jersey, Maine and Prince Edward Island, with smaller supplies from New York, Vermont and Virginia. Several cars of Katahdin seed potatoes were planted in Central Jersey by growers who found this variety to be very satisfactory last year. A 4-8-7 fertilizer mixture was used by most growers at the rate of one ton to the acre; there was, however, more of the higher analysis fertilizer (10-16-14) used this year than ever before. The growers find that the use of the higher analysis mixtures speeds up the planting operation and gives as satisfactory yields as the standard mixtures. The New Jersey growers gave careful attention to the location of the fertilizer with respect to the seed piece. A large number of new planters were purchased this year and every effort was made to see that the fertilizer was placed two inches to the side of the seed piece and on the same or a lower plane. It is too early to predict what the stand will be but the fact that high class seed was used and care exercised in planting, goes a long way to insure good stands.—WM. H. MARTIN.

LONG ISLAND

The potato season on Long Island is about three weeks later than average. The spring has been unusually cold and wet and has markedly delayed planting. Potato planting did not start in Suffolk County until March 29 and heavy planting did not start until the week of April 2. At this date, April 10, not more than 20 per cent of the crop has been planted. It is too early yet to say with any degree of accuracy if the acreage will be increased in Suffolk County and how much. However, potato growers all over the country seem to be increasing their acreage and the Suffolk County grower will probably be no exception, though there is less room for expansion of acreage here than in most other potato sections.—W. G. BEEN.

LOUISIANA

Although many vines were killed by frost on the night of March 20 most of these have recovered very well, and we have had ideal growing weather since then. The potato crop at the present time looks very

well. We have just had recent rains which will be to the advantage of the crops. Most of our potatoes will be ready for harvesting from May 1 to 15. We are expecting to ship around 2500 to 3000 cars.—
JULIAN C. MILLER.

MAINE

The potato deal in Maine is in a spirit of unrest. Prices have declined so much below the anticipations of most everyone connected with the deal and with the drawing near of increased supplies of new potatoes the picture is somewhat dubious for improvement for the balance of the season. The street price at the present time is \$1.75-\$1.90 per 165 pound barrel with little stock changing hands. The present situation furnishes plenty of food for thought when it is considered in comparison with the prospects of yields for another year. It is strange that farmers should increase their acreage when considerable difficulty has been found in moving a short crop.

It is quite difficult for growers to plan intelligently their next year's operations on the present basis of strong individualism. Indications point to a shipment of 50,000 cars from Maine this year, in comparison with 44,000 a year ago. Condition of the stock remaining is of excellent quality and is keeping in storage especially well. By April 15 the bulk of seed will have been shipped. Seed is being cleaned up surprisingly well which of course is just another indication of increased plantings throughout the potato growing areas of the country.

There seems little reason to question the Government figures of 12% increase in Maine for this coming season. The fertilizer movement is very slow to date, in fact less fertilizer has been moved than ever before in Maine. This has been partly accounted for by lateness of the season and the serious condition of the roads.

Farmers are beginning to discuss seriously the Agricultural Adjustment Administration program but as yet very little definite action has been taken, looking toward closer cooperation with the A. A. A.

The Production Credit Association which has been set up in this area has been receiving a great many applications with about the same per cent of loans being approved by either that organization or the seed loan agency that were approved last year by the Regional Agricultural Credit Corporation and the Seed Loan Agency.

One hopeful tendency which is being evidenced quite plainly is the greatly increased interest in crop rotation. Approximately 6,000 acres of green manure crops will be planted this season in Aroostook. This has increased from 10 acres four years ago.

Careful thought is being given on the part of the best seed growers to their foundation seed this Spring. There is little evidence of any increase as yet in the acreage being planted for certified seed production, but growers are endeavoring to use only the best stock available in planting. Many growers in Maine will hope that before another year rolls around there will be a concerted, intelligent effort to keep acreage within a reasonable limit in every surplus potato growing area.—Frank W. Hussey.

NEW YORK

According to latest reports the potato acreage in New York this year will be not over 2 per cent above that of 1933. This is a somewhat lower increase than that recorded for the other Eastern States excepting Pennsylvania. Fertilizer prices being approximately 20 per cent higher and seed more than double the price of last year, many of our most progressive growers will not increase their plantings while the in and outers will attempt to get by with little or no fertilizer and inferior seed.

The demand for certified Cobblers and Green Mountains has been exceptionally keen, prices for these varieties being considerably higher than those for the Rural types. Long Island growers are in the midst of planting at this date (April 12)—their season being at least 10 days late.

Interest in potato production is particularly keen with the muck growers who have recently been finding potatoes relatively more profitable than the more important muck crops. Last year there was an estimated acreage of 6000 acres of potatoes grown on muck in New York. This represents about 3 per cent of the total state acreage. We expect this increase in muck-land production to continue in view of the high yields, good table quality and comparative freedom from tuber defects obtained by these growers.—E. V. Hardenburg.

VIRGINIA

The outlook for the potato crop on the Eastern Shore of Virginia is very uncertain. Due to constant cold weather, snow and heavy rains,

the planting season has been from two to three weeks later than normal. What effect this will have on yields is probably dependent, in a large degree, upon summer temperatures and moisture but one would expect the production to be lessened and the harvest season to be later than usual.

Much seed stock was cut early and remained in storage from three to five weeks before it could be planted. During this period it was subjected to the possibilities of both cold and heat injury. Undoubtedly, both types of injury took place to some undetermined degree. Numerous growers worked over cut seed and removed injured stock as far as it could be observed, but unquestionably a certain amount of injured stock was planted, and this will have an effect on the stand of potatoes. Whether this injury is severe or light is an unknown factor at this time.

Following the March planting, our country was deluged with continued heavy floods of rain. The land was thoroughly saturated and much of it stood under water from a few hours to a couple of days. Furthermore, the water table in some fields was above the potatoes. Where this occurred, or where the fields were under water for a protracted period the seed rotted. There is a variable amount of this injury—some fields with only a few spots and other fields with several acres destroyed. Here again, there is no way of knowing definitely what injury has taken place but it is not light and relatively little has been replanted.

The prospective acreage in this territory, as published by the Bureau of Agricultural Economics, reflected the intention of the growers last Fall. This estimate showed an increase around nineteen per cent. The actual planting is much less. The acreage was kept under good control, with the dealers agreeing, and largely abiding by an agreement, to retain the acreage of credit planting at approximately the 1933 figures. The estimated ten per cent increase in acreage was, in a large measure, brought about by the return to potato cropping of acreage which had not been planted the preceding year, or by bringing back to the average those growers who had planted a very light crop in 1933.

It seems safe to estimate that the injury to the crop, as has been mentioned, will more than counterbalance the increased acreage. The Eastern Shore may actually expect to harvest less acres of potatoes than it did in 1933.

With the same acreage as in 1933, a larger total production should be produced. This is still expected despite leaching of fertilizer and possibly a spotted stand. However, the prospects for a very heavy

yield or a very large total tonnage from the Eastern Shore of Virginia are not very good at this time.

The Norfolk and Elizabeth City areas have experienced somewhat the same conditions as the Eastern Shore of Virginia. Probably Columbia and Mt. Olive in North Carolina in a lesser degree, have had the same conditions, judging from reports from those sections. Other sections of North Carolina report comparatively little injury. With the heavy increase in acreage in North Carolina it would appear that their tonnage will be considerably increased over the 1933 production.—G. S. RALSTON.

From recent observations I made on the Eastern Shore of Virginia, I feel no one need worry about the anticipated increased acreage materializing nor the yield being large. The growers have been greatly handicapped in planting, owing to the heavy rainfall and late season.

They were obliged to plant many acres in land utterly unfit to plant, and, if they obtain an average crop, I am all through worrying about well prepared seed beds.

Furthermore, the crop will surely be late. On April first it was estimated it was not more than half planted whereas it is usually all planted at that time. One large and successful grower told me the last day of March he had not planted a potato, and he would be obliged to plant his entire crop in April, although in his many years' experience he had never planted a potato so late.—FRED H. BATEMAN.

THE PRICE SITUATION

The following report on potatoes was released on April 15 by the Bureau of Agricultural Economics of the United States Department of Agriculture.

Heavy shipments resulted in a sharp decline in potato prices in central markets during March followed by some recovery in early April. The early potato crop in Florida and shipments therefrom to date are larger than a year ago. Present prospects indicate that this year's potato crop for the country as a whole may be much larger than last year's small crop. The intentions-to-plant reports indicate that as compared with 1933 much larger acreages will be planted in the early and intermediate states whereas about a 5 per cent increase is in prospect in the late states. If these intentions are carried out and average yields are obtained, total production may amount to as much as 375,000,000 bushels in 1934.

Potato prices in New York declined from \$2.71 per 100 pounds

the last week of February to \$2.13 the last week of March, then recovered slightly to \$2.16 per 100 pounds the first week of April. The present price is considerably higher than the season low point reached last November of \$1.65 and the average for a year ago of \$1.16. At Chicago, potato prices declined from \$1.80 to \$1.45 per 100 pounds during March, but recovered to \$1.63 during the first week of April. The season's low point reached in November was \$1.13 while the average at Chicago a year ago was 73 cents per 100 pounds.

Shipping point prices followed much the same trend as market prices during March with those in Middle Western and Western States making much the greater recovery during the first week in April. At Presque Isle, Maine, Green Mountain, f. o. b. prices declined from \$2.00 to \$1.40 per 100 pounds sack during March but recovered to \$1.55 during the first week in April. At Rochester, New York, round whites declined from \$1.95 to \$1.55 during March where they remained during the first week in April. F. o. b. prices at Michigan points, Cadillac rate, declined from \$1.75 to \$1.35 during March but recovered to \$1.55 per 100 pounds during the first week in April. Idaho russets at Idaho Falls declined from \$1.25 to 90 cents per 100 pounds during the past month. There has been a slight strengthening of prices during the first week of April. The United States farm prices of potatoes continued to advance through March. It was 92.2 cents per bushel on March 15 compared with 87.7 cents on February 15; 68.8 on November 15, 1933, the present season's low point and 39 cents a year ago.

Shipments of old stock potatoes from the late states totaled 138,000 carloads through April 7, compared with 116,000 last season to April 8, and 140,000 the 1932-33 season total. The heavier shipments this season may be explained by the fact that the 1933 crop was short in those areas nearest the larger consuming centers and, consequently, the truck movement has been much lighter than in the previous season. Most of the storage supplies of old potatoes are now located in Maine, Minnesota, North Dakota, and the Far Western States. Weekly shipments through most of February and March averaged well above 5,000 cars per week, but have recently declined to about 4,000 cars per week.

Shipments of new potatoes from Florida have been heavier than those of a year ago, and are due to a larger crop being harvested. The acreage of early potatoes in Florida has been increased about 42 per cent over the 1933 harvested acreage. F.o.b. prices at Hastings, Florida averaged about \$2.30 per 100 pounds during the first week of April compared with \$1.83 a year ago.

REVIEW OF RECENT LITERATURE

Potato growing in the irrigated districts of Washington, HARRY J. JENSEN and O. M. MORRIS (*Washington Sta. Bul.* 246, (1931), pp. 30, fig. 1).—Hairy vetch and sweet clover proved to be satisfactory green-manure crops. Results of variety tests indicated that the Irish Cobbler, Bliss Triumph and Netted Gem are the best now available. The results of seed source tests showed that local grown seed potatoes used for more than two consecutive years seriously reduced yields, probably due to the rapid spread of the virous diseases in potatoes grown under irrigation. It is suggested that cut seed pieces be dried for a few days before planting and that, where this cannot be done, the freshly cut seed pieces should be dusted with sulfur. Seed pieces larger than one ounce or one and one-quarter ounces in weight are not profitable. On fertile soil, with an abundance of water and with rows 33 inches apart, spacing 6 to 12 inches in the row gave largest yields of best grade potatoes. It was found that the most profitable irrigation consists of a program of water application that will keep the soil nearly uniform in moisture content throughout the growing season. The authors point out that harvesting during hot weather should be so done as to prevent exposing the potatoes to the direct rays of the sun for more than a few minutes during the process of digging.

The origin, development and increase of chloroplasts in the potato, WINONA E. STONE (*Jour. Agr. Research*, Vol. 45 (1932), No. 7, pp. 421-435, figs. 6, pl. 10).—Attempts to grow plastids from primordia outside the plant in expressed filtered leaf juice failed, and tubers, greened by exposure to the light, did not furnish satisfactory material for the study of the origin of the chloroplast. This type of greening was merely the result of the formation of chlorophyll in undifferentiated regions of the protoplasm and cannot be regarded as typical chloroplasts. No chondriosomes or plastid primordia were found in embryonic leaves. In these, independent chloroplasts develop directly from the cytoplasm. Plastids develop at different times in the same leaf, being first completed in the spongy tissue. Their development seems to be only one phase of the series of changes which together bring about the maturing of a cell. Increase in plastid number, which is much slower than the rate of cell growth, is brought about by the division of the original chloroplasts. It does not seem to be regulated either by the growth of the cell wall or by the accumulated food products. Increase in size compensates somewhat for the slow increase in plastid number. Division of chloroplasts is a process of elongation

and pinching and the connections between the new plastids may persist for some time. In general, all dividing plastids of a certain region are in approximately the same stage of division, although all stages may occur within a very limited area.

The nature of potato rugose mosaic, KARL LEE KOCK (*Phytopathology*, Vol. 23, (1933), No. 4, pp. 319-341, fig. 4).—The potato-virus-disease problem is greatly complicated by the presence of one or more viruses in apparently healthy American potatoes. Further complications arise from the fact of the irregular association of the viruses with apparently healthy European stocks of potatoes. The author states that the symptom complex, known as rugose mosaic in America, must generally be due to the mottle and the veinbanding viruses acting in combination. Almost identical symptoms, however, may result from the ring-spot and veinbanding complex either alone or in combination with the mottle virus. Still other viruses may be concerned in similar expressions of disease. It is believed that careful investigations will show that the causal agencies of the rugose-mosaic-crinkle, and streak types of potato diseases, have much in common.

The increased knowledge concerning the nature of the rugose-mosaic disease suggests several possible lines of endeavor in the direction of control. Fortunately, when the viruses concerned are combined, the result is a disease that tends to be self-exterminating. Insect control is not yet a promising line of control under field conditions but the elimination of the insect-transmitted virus through tuber indexing of the potato stock itself, seems most likely to succeed. Should it develop that other host plants actually harbor the veinbanding virus to any extent, this would no doubt offer added but perhaps no insurmountable difficulties to the propagation of virus-free stocks. The elimination of mottle virus, normally present in apparently healthy potatoes, would prevent the development of the more serious rugose mosaic disease, even though veinbanding were prevalent. Since mottle virus is not aphid-transmitted it should not be difficult to build up large stocks of seed potatoes free from this trouble. A control measure not to be overlooked is the utilization of existing varieties of resistant potatoes or of developing new strains resistant to one or more of the viruses concerned in rugose mosaic.

ESTABLISHED 1868

I. P. Thomas & Son Co.

Manufacturers of

High Grade FERTILIZERS

Brands specially formulated for

POTATOES

Distributors for

CALIFORNIA SPRAY CHEMICAL CO.'S PRODUCTS

Office

1000 Drexel Bldg.
Philadelphia, Pa.

Factory

Paulsboro, N. J.

THIS MAKES
POTATOES
PAY
BETTER



Forget time wasting and mussy seed potato "soaks!" This year give your seed a quick dip in Improved Semesan Bel. It's easy to apply; costs less to use; gives excellent results!

So powerful that one pound treats 60 to 80 bushels. So reliable that leading growers use it to prevent seed piece decay and seed-borne Rhizoctonia and scab. So effective that it has produced a 13.6% average increase in yield in many tests! For

free Potato Pamphlet UU-3, write Bayer-Semesan Co., Inc., Wilmington, Del.

IMPROVED SEMESAN BEL

Use New Improved Ceresan for wheat, oats, barley; 2% Ceresan for peas; New Improved Semesan Jr. for corn.



ESTABLISHED 1868

I. P. Thomas & Son Co.

Manufacturers of

High Grade FERTILIZERS

Brands specially formulated for

POTATOES

Distributors for

CALIFORNIA SPRAY CHEMICAL CO.'S PRODUCTS

Office

1000 Drexel Bldg.
Philadelphia, Pa.

Factory

Paulsboro, N. J.

REDUCE
SEED PIECE
DECAY

INCREASE
POTATO
YIELDS

WITH IMPROVED SEMESAN BELL



With seed costing more, it will pay you to reduce seed piece decay; prevent losses from seed-borne scab and Rhizoctonia, and to increase your yield. Quick dip treatment of all seed with *Improved Semesan Bel* will help you do it!

One pound treats 60 to 80 bush-

els. No soaking. Yields increased 10 to 20% in farm tests. For free Potato Pamphlet UU-4, write Bayer-Semesan Co., Inc., Wilmington, Delaware.

Use *New Improved Ceresan* for wheat, oats, barley; 2% *Ceresan* for peas; *New Improved Semesan Jr.* for corn.

American Potato Journal

PUBLISHED BY
THE POTATO ASSOCIATION OF AMERICA
SOMERVILLE, N. J. NEW BRUNSWICK, N. J.

OFFICERS AND EXECUTIVE COMMITTEE

JOHN R. TUCKER, *President*.....Central Experimental Farms, Ottawa, Canada
JOHN B. R. DICKET, *Vice-President*.....Agr. Exp. Sta., State College, Penn.
WM. H. MARTIN, *Secretary-Treasurer*.....Agr. Exp. Sta., New Brunswick, N. J.
J. R. LIVERMORE.....Agricultural Experiment Station, Ithaca, N. Y.
E. M. GILLIG.....Department of Agriculture, Fargo, N. D.

LOW PRODUCTION COSTS NECESSARY

The Agricultural Experiment Stations are sometimes accused of developing methods which lead to increased yields while they do little or nothing about finding an outlet for the larger crops. It is true that the work of the Experiment Stations has resulted in larger yields but it is likewise true, if their recommendations are properly applied, the grower will reduce his acreage and produce no more than he has in the past. We must have constantly in mind the fact that the total production does not determine returns to the grower. Yield per acre does. Large yields go hand in hand in low production costs.

In the months just past we have heard much about the danger of over production resulting from the increase in acreage planted. Some growers gave heed to this, others increased their acreage. It is now too late to do anything about it. Regardless of what the season brings forth in the way of total production or subsequent prices, the growers' chances of success will be determined to a very large extent by the production cost of each bushel of potatoes he grows. In those cases where production costs are high, resulting from low yields, the grower cannot hope to succeed in a year when the total production promises to be large.

The grower will be aided in the production of large yields by seeing to it that the crop is properly cultivated and thoroughly sprayed. These two measures, and particularly the latter, have been demonstrated time and again to be important factors in the production of large yields. Use the methods recommended by your Agricultural Experiment Station. These have been developed as the result of painstaking research and will be found to be sound. Their adoption will lead to increased yields. It is the grower with largest yields and lowest costs per bushel who will show a profit at the end of the year.